LISTING OF CLAIMS:

1(canceled).

2(canceled).

3(canceled).

4(canceled).

5(canceled).

6(canceled).

7(canceled).

8(canceled).

9(canceled).

10(canceled).

11(canceled).

12(canceled).

13(canceled).

14(canceled).

15(canceled).

16(canceled).

17(canceled).

18(canceled).

19(canceled).

20(canceled).

21 (canceled).

22(canceled).

23(canceled).

24(previously presented). A receiver ~~Receiver~~ apparatus for digital signals of a prescribed baud rate transmitted by respective amplitude-modulated radio-frequency carriers through a medium subject to multipath distortion, said receiver apparatus comprising:

a receiver front-end connected for responding to any selected one of said digital signals transmitted by respective amplitude-modulated radio-frequency carriers through said medium subject to multipath distortion, to generate an amplitude-modulated intermediate-frequency carrier that is amplitude-modulated in accordance with said selected one of said digital signals and any multipath distortion thereof;

demodulator and oversampling analog-to-digital conversion circuitry connected to receive said amplitude-modulated intermediate-frequency carrier from said receiver front-end and to supply a digital baseband signal at an oversampling rate higher than said prescribed baud rate;

an analyzer filter for generating the discrete Fourier transforms of successive portions of said digital baseband signal, said analyzer filter connected to receive said digital baseband signal from said demodulator and oversampling analog-to-digital conversion circuitry;

a bank of multipliers for multiplying the terms of each said discrete Fourier transform of said digital baseband signal, term by term, by respective ones of ~~an adaptive~~ a set of adaptive weighting coefficients to generate a set of products describing the discrete Fourier transform of an equalizer response to said digital baseband signal;

apparatus for generating, in response to the discrete Fourier transforms of successive portions of said digital baseband signal that provide a sampling window moving through a succession of different positions in each of successive data fields, said ~~adaptive~~ set of adaptive weighting coefficients for use by said bank of multipliers;

a synthesizer filter connected for receiving said set of products from said bank of multipliers and for generating therefrom said equalizer response as the inverse discrete Fourier transform of said discrete Fourier transform of said equalizer response described by said set of products;

a decimation filter connected for re-sampling said equalizer response supplied from said synthesizer filter to generate as a decimation filter response an equalized digital baseband signal re-sampled at said prescribed baud rate; and

decoding apparatus connected for decoding said decimation filter response to recover a data stream.

25(previously presented). The receiver apparatus of claim 24, wherein said apparatus for generating said ~~adaptive~~ set of adaptive weighting coefficients for use by said bank of multipliers comprises:

estimation circuitry responsive to said decimation filter response for generating an oversampling-rate estimation of ~~the~~ a baseband digital modulating signal in accordance with which said selected one of said digital signals was generated;

apparatus for computing the discrete Fourier transforms of successive portions of said oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said digital signals was generated, which successive portions of said oversampling-rate estimation of the baseband digital modulating signal correspond with respective ones of said successive portions of said digital baseband signal used for computing discrete Fourier transforms in said apparatus for computing the discrete Fourier transforms of successive portions of said digital baseband signal;

read-only memory for storing a discrete Fourier transform characterization of ideal reception channel response;

computer circuitry for generating discrete Fourier transform descriptions of said set of adaptive weighting coefficients, through term-by-corresponding-term multiplication of each of said discrete Fourier transforms of successive portions of said oversampling-rate estimation of the baseband digital modulating signal by said discrete Fourier transform characterization of ideal reception channel response as read from said read-only memory, followed by term-by-corresponding-term division of the resulting product terms by the discrete Fourier transform from the portion of said digital baseband signal corresponding with that said successive portion of said oversampling-rate estimation of the baseband digital modulating signal used for generating said discrete Fourier transform thereof used in said term-by-corresponding-term multiplication, thereby generating one of successive discrete Fourier transform descriptions of said ~~adaptive~~ set of adaptive weighting coefficients; and

a bank of digital lowpass filters for smoothing respective resulting terms of said successive discrete Fourier transform descriptions of said ~~adaptive~~ set of adaptive weighting coefficients, to generate respective lowpass filter responses applied to said bank of multipliers as said ~~adaptive~~ set of adaptive weighting coefficients.

26(previously presented). The receiver apparatus of claim 24, wherein said apparatus for generating said ~~adaptive~~ set of adaptive weighting coefficients for use by said bank of multipliers comprises:

estimation circuitry responsive to said decimation filter response for generating a Nyquist-filtered oversampling-rate estimation of ~~the~~ a baseband digital modulating signal in accordance with which said selected one of said digital signals was generated;

apparatus for computing the discrete Fourier transforms of successive portions of said Nyquist-filtered oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said digital signals was generated, which successive portions of said Nyquist-filtered oversampling-rate estimation of the baseband digital modulating signal correspond with respective ones of said successive portions of said digital baseband signal used for computing discrete Fourier transforms in said apparatus for computing the discrete Fourier transforms of successive portions of said digital baseband signal;

computer circuitry for generating discrete Fourier transform descriptions of said set of adaptive weighting coefficients, through term-by-corresponding-term division of each of the discrete Fourier transforms of successive portions of said Nyquist-filtered oversampling-rate estimation of the baseband digital modulating signal by the discrete Fourier transform of the corresponding portion of said digital baseband signal, thereby generating one of successive discrete Fourier transform descriptions of said ~~adaptive~~ set of adaptive weighting coefficients; and

a bank of digital lowpass filters for smoothing respective resulting terms of said successive discrete Fourier transform descriptions of said ~~adaptive~~ set of adaptive weighting coefficients to generate respective lowpass filter responses applied to said bank of multipliers as said ~~adaptive~~ set of adaptive weighting coefficients.

27(previously presented). A receiver ~~Receiver~~ apparatus for digital signals of a prescribed baud rate transmitted by respective amplitude-modulated radio-frequency carriers through a medium subject to multipath distortion, said receiver apparatus comprising:

a receiver front-end connected for responding to any selected one of said digital signals transmitted by respective amplitude-modulated radio-frequency carriers through said medium subject to multipath distortion, to generate an amplitude-modulated intermediate-frequency carrier that is amplitude-modulated in accordance with said selected one of said digital signals and any multipath distortion thereof;

analog-to-digital conversion circuitry connected to receive as its respective input signal said amplitude-modulated intermediate-frequency carrier from said receiver front-end and to supply, at an oversampling rate higher than said prescribed baud rate, a digitized amplitude-modulated intermediate-frequency carrier;

an analyzer filter for generating the discrete Fourier transforms of successive portions of said digitized amplitude-modulated intermediate-frequency carrier, said analyzer filter connected to receive said amplitude-modulated intermediate-frequency carrier from said receiver front-end;

a bank of multipliers for multiplying the terms of each said discrete Fourier transform of said amplitude-modulated intermediate-frequency carrier, term by term, by respective ones of ~~an adaptive~~ a adaptive set of weighting coefficients to generate a set of products describing the discrete Fourier transform of an equalizer response to said amplitude-modulated intermediate-frequency carrier;

apparatus for generating, in response to the discrete Fourier transforms of successive portions of said amplitude-modulated intermediate-frequency carrier that provide a sampling window moving through a succession of different positions in each of successive data fields, said successive sets ~~adaptive set~~ of adaptive weighting coefficients for use by said bank of multipliers;

a synthesizer filter connected for receiving said set of products from said bank of multipliers and for generating therefrom said equalizer response as the inverse discrete Fourier transform of said discrete Fourier transform of said equalizer response described by said set of products;

digital synchrodyne circuitry connected to receive said equalizer response from said synthesizer filter and to supply a digital baseband signal at said ~~an~~ oversampling rate higher than said prescribed baud rate;

a decimation filter connected for re-sampling said digital baseband signal supplied from said ~~demodulator and oversampling analog-to-~~digital synchrodyne ~~conversion~~ circuitry, to generate as a decimation filter response an equalized digital baseband signal re-sampled at said prescribed baud rate; and

decoding apparatus connected for decoding said decimation filter response to recover a data stream.

28(previously presented). The receiver apparatus of claim 27, wherein said apparatus for generating said successive sets of adaptive weighting coefficients for use by said bank of multipliers comprises:

estimation circuitry responsive to said decimation filter response for generating an oversampling-rate estimation of a ~~the~~ baseband digital modulating signal in accordance with which said selected one of said digital signals was generated;

a balanced amplitude modulator for modulating an oversampling-rate digital signal descriptive of an unmodulated intermediate-frequency carrier by said oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said digital signals was generated, thereby to generate an oversampling-rate digital signal descriptive of a suppressed-carrier double-sideband signal;

an ideal-channel-response vestigial-sideband filter for supplying a vestigial-sideband filter response to said oversampling-rate digital signal descriptive of the suppressed-carrier double-sideband signal supplied to said vestigial-sideband filter as its respective input signal by a connection from said balanced amplitude modulator;

a further analyzer filter for computing discrete Fourier transforms of successive portions of said vestigial-sideband filter response, which successive portions of said vestigial-sideband filter response correspond with respective ones of said successive portions of said amplitude-modulated intermediate-frequency carrier used for computing said discrete Fourier transforms thereof;

computer circuitry for generating discrete Fourier transform descriptions of said set of adaptive weighting coefficients, through term-by-corresponding-term division of each of the discrete Fourier transforms of successive portions of said vestigial-sideband filter response by the discrete Fourier transform of the corresponding portion of said digitized amplitude-modulated intermediate-frequency carrier, thereby generating one of successive discrete Fourier transform descriptions of said ~~adaptive~~ set of adaptive weighting coefficients; and

a bank of digital lowpass filters for smoothing respective resulting terms of said successive discrete Fourier transform descriptions of said ~~adaptive~~ set of adaptive weighting coefficients to generate respective lowpass filter responses applied to said bank of multipliers as said ~~adaptive~~ set of adaptive weighting coefficients.

29(currently amended). A receiver ~~Receiver~~ apparatus for digital signals of a prescribed baud rate transmitted by respective amplitude-modulated radio-frequency carriers through a medium subject to multipath distortion, said receiver apparatus comprising:

a receiver front-end connected for responding to any selected one of said digital signals transmitted by respective amplitude-modulated radio-frequency carriers through said medium subject to multipath distortion, to generate an amplitude-modulated intermediate-frequency carrier that is amplitude-modulated in accordance with said selected one of said digital signals and any multipath distortion thereof;

a first adaptive digital filter having a kernel composed of weighting coefficients that can be adjusted, said first adaptive digital filter connected for supplying a first adaptive digital filter response to said amplitude-modulated intermediate-frequency carrier generated by said receiver front-end ~~as amplitude-modulated in accordance with said selected one of said digital signals~~;

apparatus for computing respective discrete Fourier transforms responsive to successive portions of said amplitude-modulated intermediate-frequency carrier that is amplitude-modulated in accordance with said selected one of said digital signals and any multipath distortion thereof, said successive portions of said amplitude-modulated intermediate-frequency carrier providing a sampling window moving through a succession of different positions in each of successive data fields; and

apparatus for computing the weighting coefficients of said first adaptive digital filter so as to suppress an unwanted portion of said first adaptive digital filter response arising from the amplitude of said amplitude-modulated intermediate-frequency carrier being modulated in accordance with multipath distortion of said selected one of said digital signals, with the computations of said weighting coefficients being based on said discrete Fourier transforms of said successive portions of said amplitude-modulated intermediate-frequency carrier providing said sampling window moving through said succession of different positions in each of said successive data fields.

30(previously presented). The receiver apparatus of claim 29, wherein said sampling window moving through the ~~a~~ succession of different positions in each of said successive data fields generally advances a given number of samples at a time.

31(previously presented). The receiver apparatus of claim 29, wherein said sampling window moving through the ~~a~~ succession of different positions in each of said successive data fields generally moves block-by-block over contiguous successive portions of said amplitude-modulated intermediate-frequency carrier.

32(previously presented). The receiver apparatus of claim 29, wherein said first adaptive digital filter is a baseband filter having a kernel of weighting coefficients, and wherein said receiver apparatus further comprises, within said apparatus for computing discrete Fourier transforms responsive to successive portions of said amplitude-modulated intermediate-frequency carrier that is amplitude-modulated in accordance with said selected one of said digital signals and any multipath distortion:

demodulator and oversampling analog-to-digital conversion circuitry connected to receive said amplitude-modulated intermediate-frequency carrier from said receiver front-end and to supply a digital baseband signal sampled at an oversampling rate higher than said prescribed baud rate, which digital baseband signal is applied as a respective input signal to said first adaptive digital filter; and

apparatus for computing said discrete Fourier transforms from successive portions of said digital baseband signal, which successive portions of said digital baseband signal respectively result from demodulation of said successive portions of said amplitude-modulated intermediate-frequency carrier, said demodulator and oversampling analog-to-digital conversion circuitry being connected to supply said digital baseband signal to said apparatus for computing said discrete Fourier transforms from successive portions of said digital baseband signal.

33(previously presented). The receiver apparatus of claim 32, wherein the kernel of said first adaptive digital filter has weighting coefficients at intervals corresponding with integral numbers of half cycles of said oversampling rate, said receiver apparatus further comprising:

a decimation filter connected for re-sampling said first adaptive digital filter response to generate a decimation filter response that re-samples said digital baseband signal to said prescribed baud rate; and

decoding apparatus connected for decoding said decimation filter response to recover a data stream.

34(previously presented). The receiver apparatus of claim 33, as constructed for the reception of vestigial-sideband digital television broadcast signals, wherein said decoding apparatus comprises:

trellis decoding apparatus for decoding said decimation filter response to generate trellis-decoded data, said trellis decoding apparatus being connected to receive said decimation filter response from said decimation filter;

a data de-interleaver for de-interleaving convolutional interleaving in said trellis-decoded data to generate a data de-interleaver response, said data de-interleaver being connected to receive said trellis-decoded data from said trellis decoding apparatus;

Reed-Solomon error correction circuitry for correcting errors in said de-interleaver response to recover randomized data, said Reed-Solomon error correction circuitry being connected to receive said data de-interleaver response from said data de-interleaver; and

a data de-randomizer for de-randomizing said randomized data to recover a transport stream for application to a further portion of said receiver apparatus.

35(previously presented). The receiver apparatus of claim 33, wherein said apparatus for computing the weighting coefficients of said first adaptive digital filter comprises:

estimation circuitry responsive to said decimation filter response for generating an oversampling-rate estimation of ~~the~~ a baseband digital modulating signal in accordance with which said selected one of said digital signals was generated;

apparatus for computing the discrete Fourier transforms of successive portions of said oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said digital signals was generated, which successive portions of said oversampling-rate estimation of the baseband digital modulating signal correspond with respective ones of said successive portions of said digital baseband signal used for computing discrete Fourier transforms in said apparatus for computing the discrete Fourier transforms of successive portions of said digital baseband signal;

read-only memory for storing a discrete Fourier transform characterization of ideal reception channel response;

computer circuitry for generating discrete Fourier transform characterizations of the actual reception channel, through term-by-corresponding-term multiplication of each of said discrete Fourier transforms of successive portions of said oversampling-rate estimation of the baseband digital modulating signal by said discrete Fourier transform characterization of ideal reception channel response as read from said read-only memory, followed by term-by-corresponding-term division of the resulting product terms by the discrete Fourier transform of the portion of said digital baseband signal corresponding with that said successive portion of said oversampling-rate estimation of the baseband digital modulating signal generating said discrete Fourier transform thereof used in said term-by-corresponding-term multiplication, followed by inverse discrete Fourier transformation of ~~the~~ resulting quotient terms to generate one of a set of successive inverse discrete Fourier transforms; and

a bank of digital lowpass filters for smoothing the terms of said successive inverse discrete Fourier transforms to specify the weighting coefficients in the kernel of said first adaptive digital filter.

36(previously presented). The receiver apparatus of claim 35, wherein said estimation circuitry comprises:

a data slicer connected to receive said decimation filter response from said decimation filter and to supply a quantized decimation filter response;

a symbol coder for recoding said quantized decimation filter response into a baud-rate estimation of the baseband digital modulating signal; and

an interpolation filter of a type that essentially preserves in its output signal the system function described in its input signal, said interpolation filter connected for receiving said baud-rate estimation of the baseband digital modulating signal and for supplying said oversampling-rate estimation of the baseband digital modulating signal to said apparatus for computing the discrete Fourier transforms of successive portions of said oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said digital signals was generated.

37(previously presented). The receiver apparatus of claim 35, wherein said estimation circuitry comprises:

a trellis decoder also included within said decoding apparatus connected for decoding said decimation filter response to recover said data stream, said trellis ~~coder~~ decoder connected to receive said decimation filter response from said decimation filter and to supply preliminary estimates of symbol values as well as a trellis decoder response;

a symbol coder for recoding said preliminary estimates of symbol values supplied from said trellis decoder response, to generate a baud-rate estimation of the baseband digital modulating signal; and

an interpolation filter of a type that essentially preserves in its output signal the system function described in its input signal connected for receiving said baud-rate estimation of the baseband digital modulating signal and for supplying said oversampling-rate estimation of the baseband digital modulating signal to said apparatus for computing the discrete Fourier transforms of successive portions of said oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said digital signals was generated.

38(previously presented). The receiver apparatus of claim 35, wherein said apparatus for computing the discrete Fourier transforms of successive portions of each data field of said digital baseband signal is of a type using a sliding window of said digital baseband signal for such computation, and wherein said apparatus for computing the discrete Fourier transforms of successive portions of said oversampling-rate estimation is of a type using a sliding window of said oversampling-rate estimation for such computation.

39(previously presented). The receiver apparatus of claim 33, wherein said apparatus for computing the weighting coefficients of said first adaptive digital filter comprises:

estimation circuitry responsive to said decimation filter response for generating a Nyquist-filtered oversampling-rate estimation of ~~the~~ a baseband digital modulating signal in accordance with which said selected one of said digital signals was generated;

apparatus for computing the discrete Fourier transforms of successive portions of said Nyquist-filtered oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said digital signals was generated, which successive portions of said Nyquist-filtered oversampling-rate estimation of the baseband digital modulating signal correspond with respective ones of said successive portions of said digital baseband signal used for computing discrete Fourier transforms in said apparatus for computing the discrete Fourier transforms of successive portions of said digital baseband signal;

computer circuitry for generating discrete Fourier transform descriptions of the kernel desired in said first adaptive digital filter through term-by-corresponding-term division of each of the discrete Fourier transforms of successive portions of said Nyquist-filtered oversampling-rate estimation of the baseband digital modulating signal by the discrete Fourier transform of the corresponding portion of said digital baseband signal, and thereafter generating inverse discrete Fourier transforms of said discrete Fourier transform descriptions of the kernel desired in said first adaptive digital filter, and

a bank of digital lowpass filters for smoothing the terms of said inverse discrete Fourier transforms to specify the weighting coefficients in the kernel of said first adaptive digital filter.

40(previously presented). The receiver apparatus of claim 39, wherein said estimation circuitry comprises:

a data slicer connected to receive said decimation filter response from said decimation filter and to supply a quantized decimation filter response;

a symbol coder for recoding said quantized decimation filter response into a baud-rate estimation of the baseband digital modulating signal; and

an interpolation filter connected for receiving said baud-rate estimation of the baseband digital modulating signal and supplying said Nyquist-filtered oversampling-rate estimation of the baseband digital modulating signal to said apparatus for computing the discrete Fourier transforms of successive portions of said Nyquist-filtered oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said digital signals was generated.

41(previously presented). The receiver apparatus of claim 39, wherein said estimation circuitry comprises:

a trellis decoder also included within said decoding apparatus connected for decoding said decimation filter response to recover said data stream, said trellis ~~coder~~ decoder connected to receive said decimation filter response from said decimation filter and to supply preliminary estimates of symbol values as well as a trellis decoder response;

a symbol coder for recoding said preliminary estimates of symbol values supplied from said trellis decoder response, to generate a baud-rate estimation of the baseband digital modulating signal; and

an interpolation filter connected for receiving said baud-rate estimation of the baseband digital modulating signal and supplying said Nyquist-filtered oversampling-rate estimation of the baseband digital modulating signal to said apparatus for computing the discrete Fourier transforms of successive portions of said Nyquist-filtered oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said digital signals was generated.

42(previously presented). The receiver apparatus of claim 29, wherein said first adaptive digital filter is a baseband filter connected for responding to a real component of a digital baseband signal; and wherein said receiver apparatus further comprises, within said apparatus for computing discrete Fourier transforms responsive to successive portions of said amplitude-modulated intermediate-frequency carrier that is amplitude-modulated in accordance with said selected one of said digital signals and any multipath distortion:

a controlled oscillator for generating in-phase oscillations and quadrature-phase oscillations as components of complex oscillations, the frequency and phase of which said complex oscillations are controlled by an automatic frequency and phase control signal;

a first mixer connected for mixing said amplitude-modulated intermediate-frequency carrier supplied from said receiver front-end with said in-phase oscillations to generate a first mixer response;

a first analog lowpass filter connected to receive said first mixer response as a respective input signal and to supply an analog in-phase baseband signal in response thereto;

a first analog-to-digital converter connected for digitizing said analog in-phase baseband signal to generate a digital in-phase baseband signal sampled at an oversampling rate higher than said prescribed baud rate and applied to said first adaptive digital filter as its respective input signal; and

apparatus for computing said discrete Fourier transforms from successive portions of said digital in-phase baseband signal, which successive portions of said digital in-phase baseband signal respectively result from demodulation of said successive portions of said amplitude-modulated intermediate-frequency carrier, said first analog-to-digital converter being connected to supply said digital in-phase baseband signal to said apparatus for computing said discrete Fourier transforms from successive portions of said digital in-phase baseband signal.

43(previously presented). The receiver apparatus of claim 44, wherein said apparatus for computing said discrete Fourier transforms of successive portions ~~of each data field~~ of said digital in-phase baseband signal is of a type using a sliding window of said digital baseband signal for such computation, and wherein said apparatus for computing ~~the~~ said discrete Fourier transforms of successive portions of said oversampling-rate estimation is of a type using a sliding window of said oversampling-rate-estimation for such computation.

44(previously presented). The receiver apparatus of claim 42, further comprising:

a second mixer connected for mixing said amplitude-modulated intermediate-frequency carrier supplied from said receiver front-end with said quadrature-phase oscillations to generate a second mixer response;

a second analog lowpass filter connected to receive said second mixer response as a respective input signal and to supply an analog quadrature-phase baseband signal in response thereto;

a second analog-to-digital converter connected for digitizing said analog quadrature-phase baseband signal to generate a digital quadrature-phase baseband signal sampled at said oversampling rate higher than said prescribed baud rate;

a second adaptive digital filter having a kernel composed of weighting coefficients that can be adjusted to be similar to said kernel of said first adaptive digital filter, said second analog-to-digital converter being connected to said second adaptive digital filter for applying said digital quadrature-phase baseband signal to said second adaptive digital filter as its respective input signal, said second adaptive digital filter supplying a second adaptive digital filter response to its input signal as convolved with said kernel of said second adaptive digital filter;

a digital-to-analog converter connected to receive as its respective input signal said second adaptive digital filter response from said second adaptive digital filter and connected to supply an analog response therefrom;

a third analog lowpass filter connected to receive as its respective input signal said analog response from said digital-to-analog converter and to supply a third analog lowpass filter response therefrom to said controlled oscillator as said automatic frequency and phase control signal;

a decimation filter connected for re-sampling said first adaptive digital filter response to generate, as a decimation filter response, an in-phase digital baseband signal re-sampled at said prescribed baud rate;

decoding apparatus connected for decoding said decimation filter response to recover a data stream;

estimation circuitry responsive to said decimation filter response for generating an oversampling-rate estimation of ~~the~~ a baseband digital modulating signal in accordance with which said selected one of said digital signals was generated;

apparatus for computing the discrete Fourier transforms of successive portions of said oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said digital signals was generated, which successive portions of said oversampling-rate estimation of the baseband digital modulating signal correspond with respective ones of said successive portions of said digital baseband signal used for computing discrete Fourier transforms in said apparatus for computing the discrete Fourier transforms of successive portions of said digital baseband signal;

computer circuitry for generating discrete Fourier transform characterizations of an ~~the~~ actual reception channel through term-by-corresponding-term division of each of the discrete Fourier transforms of successive portions of said oversampling-rate estimation of the baseband digital modulating signal by the discrete Fourier transform of the corresponding portion of said digital baseband signal, thereafter generating discrete Fourier transform descriptions of the kernel desired in each of said first and said second adaptive digital filters through term-by-corresponding-term division of each of the discrete Fourier transform characterizations of the actual reception channel by a discrete Fourier transform characterization of an ideal reception channel, and thereafter generating inverse discrete Fourier transforms of said discrete Fourier transform descriptions of the kernel desired in each of said first and said second adaptive digital filters; and

a bank of digital lowpass filters for smoothing the terms of said inverse discrete Fourier transforms to specify the weighting coefficients in the kernel of each of said first and said second adaptive digital filters.

45(previously presented). The receiver apparatus of claim 29, further comprising:

analog-to-digital conversion circuitry connected to receive as its respective input signal said amplitude-modulated intermediate-frequency carrier from said receiver front-end and to supply, at an oversampling rate higher than said prescribed baud rate, a digitized amplitude-modulated intermediate-frequency carrier applied as respective input signals to said first adaptive digital filter and to said apparatus for computing discrete Fourier transforms responsive to successive portions of said amplitude-modulated intermediate-frequency carrier that is amplitude-modulated in accordance with said selected one of said digital signals and any multipath distortion thereof;

a digital controlled oscillator for supplying at said oversampling rate digital descriptions of in-phase oscillations and quadrature-phase oscillations as components of complex oscillations, the frequency and phase of which said complex oscillations are controlled by an automatic frequency and phase control signal;

digital synchrodyne circuitry for supplying a digital baseband signal in response to said first adaptive digital filter response, said first adaptive digital filter connected to apply said first adaptive digital filter response to said digital synchrodyne circuitry as a respective input signal thereof, said digital controlled oscillator connected for supplying said descriptions of said in-phase oscillations to said digital synchrodyne circuitry for synchrodyning with said first adaptive digital filter response to generate a real component of said digital baseband signal at said oversampling rate, said controlled oscillator connected for supplying said descriptions of said quadrature-phase oscillations to said digital synchrodyne circuitry for synchrodyning with said first adaptive digital filter response to generate an imaginary component of said digital baseband signal at said oversampling rate;

a digital lowpass filter connected to receive said imaginary component of said digital baseband signal from said digital synchrodyne circuitry and connected to supply its lowpass filter response to said controlled oscillator as said automatic frequency and phase control signal;

a decimation filter connected for re-sampling said real component of said digital baseband signal supplied from said digital synchrodyne circuitry to generate, as a decimation filter response, a real component of digital baseband signal re-sampled at said prescribed baud rate;

decoding apparatus connected for decoding said decimation filter response to recover a data stream;

estimation circuitry responsive to said decimation filter response for generating an oversampling-rate estimation of ~~the~~ a baseband digital modulating signal in accordance with which said selected one of said digital signals was generated;

a balanced amplitude modulator for modulating an oversampling-rate digital signal descriptive of an unmodulated intermediate-frequency carrier by said oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said digital signals was generated, thereby to generate an oversampling-rate digital signal descriptive of a suppressed-carrier double-sideband signal, said balanced amplitude modulator connected to receive digital descriptions of oscillations from said digital controlled oscillator as said oversampling-rate digital signal descriptive of the unmodulated intermediate-frequency carrier;

an ideal-channel-response vestigial-sideband filter for supplying a vestigial-sideband filter response to said oversampling-rate digital signal descriptive of ~~a~~ the suppressed-carrier double-sideband signal supplied to said vestigial-sideband filter as its respective input signal by a connection from said balanced amplitude modulator;

apparatus for computing discrete Fourier transforms of successive portions of said vestigial-sideband filter response, which successive portions of said vestigial-sideband filter response correspond with respective ones of said successive portions of said amplitude-modulated intermediate-frequency carrier used for computing said discrete Fourier transforms thereof;

computer circuitry for generating discrete Fourier transform descriptions of ~~the~~ a kernel desired in said first adaptive digital filter through term-by-corresponding-term division of each of the discrete Fourier transforms of successive portions of said vestigial-sideband filter response by the discrete Fourier transform of the corresponding portion of said amplitude-modulated intermediate-frequency carrier, and thereafter generating inverse discrete Fourier transforms of said discrete Fourier transform descriptions of the kernel desired in said first adaptive digital filter; and

a bank of digital lowpass filters for smoothing the terms of said inverse discrete Fourier transforms to specify the weighting coefficients in the kernel of said first adaptive digital filter.

46(previously presented). ~~Receiver~~ A receiver apparatus for single-carrier digital modulation signals of a prescribed baud rate transmitted by respective amplitude-modulated radio-frequency carriers through a medium subject to multipath distortion, said receiver apparatus comprising:

a receiver front-end connected for responding to any selected one of said single-carrier digital modulation signals transmitted at radio frequencies, thereby to supply a converted digital modulation signal at intermediate frequencies;

synchrodyning circuitry connected for responding to said converted digital modulation signal to supply a first digital baseband signal and a second digital baseband signal, said first digital baseband signal resulting from synchrodyning said converted digital modulation signal with an intermediate-frequency carrier of a leading first phasing, said second digital baseband signal resulting from synchrodyning said converted digital modulation signal with an intermediate-frequency carrier of a lagging second phasing in quadrature with said leading first phasing, the relative lead of said first phasing of said intermediate-frequency carrier and the relative lag of said second phasing of said intermediate-frequency carrier being adjustable in response to an automatic frequency and phase control signal;

first and second adaptive digital filters, each having a respective kernel composed of weighting coefficients that can be adjusted, said first adaptive digital filter connected to receive as its respective input signal said first digital baseband signal supplied by said synchrodyning circuitry, said first adaptive digital filter connected to supply a first adaptive digital filter response to its respective input signal, said second adaptive digital filter connected to receive as its said respective input signal said second digital baseband signal supplied by said synchrodyning circuitry, and said second adaptive digital filter connected to supply a second adaptive digital filter response to its respective input signal;

a first adaptive-filter-kernel computer for computing the weighting coefficients in the kernel of said first adaptive digital filter, said first adaptive-filter-kernel computer connected to receive said first adaptive digital filter response and to receive said first digital baseband signal supplied by said synchrodyning circuitry;

a second adaptive-filter-kernel computer for computing the weighting coefficients in the kernel of said second adaptive digital filter, said second adaptive-filter-kernel computer connected to receive said second adaptive digital filter response and to receive said second digital baseband signal supplied by said synchrodyning circuitry;

apparatus for recovering a data stream from an equalized in-phase digital modulation signal that is formed by combining said first adaptive digital filter response and said second adaptive digital filter response in a first way; and

apparatus for recovering said automatic frequency and phase control signal from an equalized quadrature-phase digital modulation signal that is formed by combining said first adaptive digital filter response and said second adaptive digital filter response in a second way, one of said first and second ways of combining said first adaptive digital ~~decimation~~ filter response and said second adaptive digital ~~decimation~~ filter response being additive in nature and the other being subtractive in nature.

47(previously presented). The receiver apparatus of claim 46, wherein said first adaptive-filter-kernel computer and said second adaptive-filter-kernel computer are each of a type using discrete Fourier transform procedures in its computations.

48(previously presented). The receiver apparatus of claim 46, wherein said first adaptive-filter-kernel computer is operable to compute the discrete Fourier transforms of successive portions of said first digital baseband signal that provide a sampling window moving through a succession of different positions in each of successive data fields, to quantize said first adaptive digital ~~decimation~~ filter response and generate therefrom a first estimation of a ~~the~~ baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated, to compute the discrete Fourier transforms of portions of said first estimation corresponding to said successive portions of said second digital baseband signal, to process the discrete Fourier transform of each portion of said first digital baseband signal with the discrete Fourier transform of the corresponding portion of said first adaptive digital ~~decimation~~ filter response for generating a discrete Fourier transform descriptive of a ~~the~~ kernel desired in said first adaptive digital filter,

to generate the inverse discrete Fourier transform of said discrete Fourier transform descriptive of the kernel desired in said first adaptive digital filter, and to generate the weighting coefficients for the kernel of said first adaptive digital filter by lowpass filtering each of the terms of the inverse discrete Fourier transform of said discrete Fourier transform descriptive of the kernel desired in said first adaptive digital filter; and

wherein said second adaptive-filter-kernel computer is operable to compute the discrete Fourier transforms of successive portions of said second digital baseband signal that generally are contiguous in time, to quantize said second adaptive digital ~~decimation~~ filter response and generate therefrom a second estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated, to compute the discrete Fourier transforms of portions of said second estimation corresponding to said successive portions of said second digital baseband signal, to process the discrete Fourier transform of each portion of said second digital baseband signal with the discrete Fourier transform of the corresponding portion of said second adaptive digital ~~decimation~~ filter response for generating a discrete Fourier transform descriptive of the kernel desired in said second adaptive digital filter, to generate the inverse discrete Fourier transform of said discrete Fourier transform descriptive of a ~~the~~ kernel desired in said second adaptive digital filter, and to generate the weighting coefficients for the kernel of said second adaptive digital filter by lowpass filtering each of the terms of the inverse discrete Fourier transform of said discrete Fourier transform descriptive of the kernel desired in said second adaptive digital filter.

49(previously presented). A receiver ~~Receiver~~ apparatus for single-carrier digital modulation signals of a prescribed baud rate transmitted by respective amplitude-modulated radio-frequency carriers through a medium subject to multipath distortion, said receiver apparatus comprising:

apparatus for converting a selected one of said single-carrier digital modulation signals transmitted at radio frequencies to an amplitude-modulated intermediate-frequency carrier;

an analog-to-digital converter connected to receive as its respective input signal said amplitude-modulated intermediate-frequency carrier from said apparatus for converting said selected one of said single-carrier digital modulation signals and to supply, at an oversampling rate higher than said prescribed baud rate, a digitized amplitude-modulated intermediate-frequency carrier;

a phase-splitter connected to receive as its respective input signal said digitized amplitude-modulated intermediate-frequency carrier supplied from said analog-to-digital converter, said phase-splitter operable to supply orthogonal first and second phase-splitter responses;

first and second adaptive digital filters, each having a respective kernel composed of weighting coefficients that can be adjusted, said first adaptive digital filter connected to receive as its respective input signal said first phase-splitter response supplied by said phase-splitter, said first adaptive digital filter connected to supply a first adaptive digital filter response to its respective input signal, said second adaptive digital filter connected to receive as its said respective input signal said second phase-splitter response supplied by said phase-splitter ~~and oversampling analog-to-digital conversion circuitry~~, and said second adaptive digital filter connected to supply a second adaptive digital filter response to its respective input signal;

digital synchrodyne circuitry connected for generating at said oversampling rate a first digital baseband signal by synchrodyning said first adaptive digital filter response with an intermediate-frequency carrier of a leading first phasing and for generating at said oversampling rate a second digital baseband signal by synchrodyning said second adaptive digital filter response with an intermediate-frequency carrier of a lagging second phasing, the relative lead of said first phasing of said intermediate-frequency carrier and the relative lag of said second phasing of said intermediate-frequency carrier being adjustable in response to an automatic frequency and phase control signal;

a first decimation filter connected for supplying a first decimation filter response generated by re-sampling to said prescribed baud rate said first digital baseband signal generated by said digital synchrodyne circuitry;

a second decimation filter connected for supplying a second decimation filter response generated by re-sampling to said prescribed baud rate said second digital baseband signal generated by said digital synchrodyne circuitry;

a first adaptive-filter-kernel computer for computing the weighting coefficients in the kernel of said first adaptive digital filter, said first adaptive-filter-kernel computer connected to receive said first decimation filter response and to receive said first phase-splitter response supplied by said phase-splitter;

a second adaptive-filter-kernel computer for computing the weighting coefficients in the kernel of said second adaptive digital filter, said second adaptive-filter-kernel computer connected to receive said second decimation filter response and to receive said second phase-splitter response supplied by said phase-splitter;

apparatus for recovering a data stream from an equalized in-phase digital modulation signal that is formed by combining said first decimation filter response and said second decimation filter response in a first way; and

apparatus for recovering said automatic frequency and phase control signal from an equalized quadrature-phase digital modulation signal that is formed by combining said first decimation filter response and said second decimation filter response in a second way, one of said first and second ways of combining said first decimation filter response and said second decimation filter response being additive in nature and the other being subtractive in nature.

50(previously presented). The receiver apparatus of claim 49, wherein said first adaptive-filter-kernel computer and said second adaptive-filter-kernel computer are each of a type using discrete Fourier transform procedures in its computations.

51(previously presented). The receiver apparatus of claim 49, wherein said first adaptive-filter-kernel computer is operable to compute the discrete Fourier transforms of successive portions of said first phase-splitter response that provide a sampling window moving through a succession of different positions in each of successive data fields, to quantize said first decimation filter response and generate therefrom a first estimation of ~~the~~ a baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated, to generate a first re-modulation signal by modulating said intermediate-frequency carrier of said leading first phasing with said first estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated, to compute the discrete Fourier transforms of portions of said first re-modulation signal corresponding to said successive portions of said first phase-splitter response, to process the discrete Fourier transform of each portion of said first phase-splitter response with the discrete Fourier transform of the corresponding portion of said first re-modulation signal for generating a discrete Fourier transform descriptive of ~~the~~ a kernel desired in said first adaptive digital filter, to generate the inverse discrete Fourier transform of said discrete Fourier transform descriptive of the kernel desired in said first adaptive digital filter, and to generate the weighting coefficients for the kernel of said first adaptive digital filter by lowpass filtering each of the terms of the inverse discrete Fourier transform of said discrete Fourier transform descriptive of the kernel desired in said first adaptive digital filter; and wherein said second adaptive-filter-kernel computer is operable to compute the discrete Fourier transforms of successive portions of said second phase-splitter response that generally are contiguous in time, to quantize said second decimation filter response and generate therefrom a second estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated, to generate a second re-modulation signal by modulating said intermediate-frequency carrier of said lagging second phasing with said second estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated, to compute the discrete Fourier transforms of portions of said second re-modulation signal corresponding to said successive portions of said second phase-splitter response, to process the discrete Fourier transform of each portion of said second phase-splitter response with the discrete Fourier transform of the corresponding portion of said second re-modulation signal for generating a discrete Fourier transform descriptive of ~~the~~ a kernel desired in said second adaptive digital filter,

to generate the inverse discrete Fourier transform of said discrete Fourier transform descriptive of the kernel desired in said second adaptive digital filter, and to generate the weighting coefficients for the kernel of said second adaptive digital filter by lowpass filtering each of the terms of the inverse discrete Fourier transform of said discrete Fourier transform descriptive of the kernel desired in said second adaptive digital filter.

52(previously presented). A method for adapting weighting coefficients for channel equalization filtering in a receiver for a digital signal of a prescribed baud rate transmitted by respective amplitude-modulated radio-frequency carriers through a channel apt to include more than transmission path for said digital signal, which digital signal is in substantial part randomized and is disposed in successive data fields, said method comprising the steps of:

estimating from an ~~the~~ actual input signal with accompanying multipath distortion thereof that is supplied to said channel equalization filtering what an ~~the~~ ideal input signal supplied to said channel equalization filtering would be in the absence of said accompanying multipath distortion thereof;

computing respective discrete Fourier transforms for successive portions of said actual input signal supplied to said channel equalization filtering and corresponding successive portions of said ideal input signal estimated from said actual input signal, said successive portions of ~~said~~ said actual input signal providing a sampling window moving through a succession of different positions in each of said successive data fields including said substantial parts that are randomized;

generating discrete Fourier transform specifications of said channel equalization filtering, through term-by-corresponding-term division of each of the discrete Fourier transforms of successive portions of said ideal input signal by the discrete Fourier transform of the corresponding portion of said actual input signal supplied to said channel equalization filtering;

computing tentative sets of weighting coefficients for said channel equalization filtering from said discrete Fourier transform specifications of said channel equalization filtering;

low-pass filtering successive said tentative sets of weighting coefficients for said channel equalization filtering to generate discrete Fourier transform descriptions of final sets of weighting coefficients for said channel equalization filtering; and

utilizing said final sets of weighting coefficients for said channel equalization filtering.

53(previously presented). The method of claim 52, wherein said channel equalization filtering is performed in the time domain, and wherein said step of computing tentative sets of weighting coefficients for said channel equalization filtering from said discrete Fourier transform specifications of said channel equalization filtering essentially consists of computing the inverse discrete Fourier transforms of said discrete Fourier transform specifications of said channel equalization filtering.

54(previously presented). The method of claim 52, wherein said channel equalization filtering is performed in the frequency domain, said method further comprising the steps of:

multiplying said respective discrete Fourier transforms for successive portions of said actual input signal supplied to said channel equalization filtering, term-by-term, by said discrete Fourier transform specifications of said channel equalization filtering to generate discrete Fourier transforms for successive portions of a response from said channel equalization filtering; and

computing the inverse discrete Fourier transforms of said discrete Fourier transforms for successive portions of said response from said channel equalization filtering, thereby to generate said successive portions of said response from said channel equalization filtering.